

into the canyons it may at first seem the more surprising that no representatives of the large Red Haw group and some of the other *Rosaceae*, whose fruit is so attractive and which are commonly transported through their migrations over wide areas, should have found their way here. The explanation is no doubt found in the fact that species of these groups are rare or absent from most of the Edwards Plateau region and from that to the southwest.

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A NEW SPECIES OF PISTACIA NATIVE TO SOUTHWESTERN TEXAS, *P. TEXANA*

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IN 1859 John Torrey¹ reported *Pistacia mexicana* HBK. as occurring in Texas in "Rocky ravines near the mouth of the Pecos, western Texas, October (fruit); Bigelow. A small tree."

In 1891 John Coulter² included the species *Pistacia mexicana* HBK. in his Botany of Western Texas, with a very brief description, ending with the following statement: "A small Mexican tree, with an edible nut,³ said to occur near the mouth of the Pecos."

In 1897 Asa Gray⁴ described fruiting material in some detail in his Synoptical Flora and, although he had not seen the flowers, transferred the species to the genus *Rhus* as the sole species of a new section, *Pistacioides*. The name *Rhus mexicana* Gray, is cited as having been published "in Patterson, check-list, 1892, 21," but this check-list (Patterson's Numbered Check-list of North American Plants, North of Mexico, p. 21. [Oquakwa, 1892]) gives merely a *nomen nudum*, "RHUS . . . 1690 Mexicana Gray." with no citations of the previously published *Pistacia mexicana* HBK.

In 1905 Vernon Bailey,⁵ in his Biological Survey of Texas, assigns the plant to *Schmaltzia* (a segregate of *Rhus*, based on *Rhus aromatica*, Ait.) as *Schmaltzia mexicana*, citing *Rhus mexicana* and *Pistacia mexicana* as synonyms, and notes its relationship to the *Pistacia vera* from which the pistache nut of commerce is obtained. He goes on to say, "In places in the canyons of the Rio Grande this large shrub grows in profusion, suggesting that the real *pistachio* also might succeed here."

Aside from occasional citations of the scanty information given in these

¹ Torrey, John. Botany of the Boundary, in Emory, William H., Report on the United States and Mexican Boundary Survey (34th Cong. 1st Sess. Senate Ex. Doc. No. 108). II. pt. 1, p. 44 (Washington, 1859).

² Coulter, John M. Botany of Western Texas, in Contributions from the U.S. National Herbarium, Washington, D.C. II. 67 (June 27, 1891).

³ This is an error, as the seeds are too small to be classed as edible.

⁴ Gray, Asa. Synoptical Flora of North America, I. 386, also p. 381 (Part 1, fasc. 2, June 10, 1897).

⁵ Bailey, Vernon. Biological Survey of Texas, in North American Fauna (U.S. Dept. Agriculture). No. 25, p. 30. (Washington, 1905.)

sources practically nothing else has been published regarding this Texas plant which has always been assumed to be *Pistacia mexicana* HBK.

In 1902 I began a study of the genus *Pistacia* in order to ascertain the botanical relationships of *Pistacia vera* L., the cultivated Pistache nut, which I was endeavoring to introduce into culture on a commercial scale in California, Arizona and other Southwestern States. I soon satisfied myself from a study of the material preserved in the principal old-world and American herbaria that *Pistacia mexicana* HBK. was very different from any old-world species, but in the absence of flowers it was difficult to come to any decision as to the true relationship.

In March, 1907, through the courtesy of Mr. C. S. Scofield, his assistant, Mr. F. D. Headley, the superintendent of the San Antonio Experiment Farm, was sent to the mouth of the Pecos River in Valverde County, Texas, to secure flowering specimens of this plant. Mr. Headley secured some good specimens of both sexes, with photographs. A study of this material showed at once that it could not belong to a species of *Rhus* as supposed by Gray, but was very near *Pistacia*.

In March, 1911, Prof. S. C. Mason, aided by Mr. Stephen H. Hastings and Mr. R. E. Blair, collected additional and much better material and photographs in the same general region near the junction of the Pecos River with the Rio Grande. This additional material, together with Professor Mason's ample notes made on this and on two previous trips in March and April, 1910, permitted me to get a very good understanding of the Texas species.

The *Pistacia mexicana* HBK. was based on fruiting specimens collected at Chilpancingo in the State of Guerrero about 750 miles south of Valverde County, Texas. In the principal American herbaria there is fairly abundant material from the States of Puebla and Oaxaca which adjoin Guerrero, and even from the type locality, Chilpancingo, Guerrero (U.S. Nat. Herb. No. 399406, E. W. Nelson No. 7065, "Side of Sierra Madre, above Chilpancingo," May 25, 1903, fruiting branch) and some from Jalisco and Chiapas, all of which doubtless belongs to *Pistacia mexicana* HBK. A single fruiting specimen in the National Herbarium at Washington, D.C. (No. 867188), collected by Mr. O. F. Cook (No. 60, June 1, 1906) from "rough limestone country between Nenton and Candalaria, Dept. de Huehuetenango in northwestern Guatemala near the Mexican border," may be the same species but looks somewhat different.

In May, 1912, Mr. C. A. Purpus collected abundant material at Tehuacan, Puebla (No. 5848), and sent it to me together with a good photograph showing the habit of the species. He also sent in May, 1912, a quantity of seed, of which a very small percentage (38 out of 1754) germinated, and gave rise to plants (C.P.B. No. 7581) now growing in the greenhouses of the Bureau of Plant Industry at Washington, D.C., and also in the open in California.

On the other hand, there is some good material, mostly of the fruiting specimens only, from the northeastern Mexican States of Coahuila, Nuevo

Leon and Tamaulipas, that seems very like the Texas plant and distinctly different from the true *Pistacia mexicana* HBK. of southern Mexico.

Thanks to this wealth of material of both the southern Mexican and the Texas Pistaches, I am now convinced that the Texas plants constitute a good species, for which I propose the name *Pistacia texana*, n. sp.

Pistacia texana, n. sp.

Pistacia foliis subpersistentibus, foliolis plus minusve curvatis, obtusis, submucronatis, subspathulatis; fructibus maturis profunde rubro-brunneis.

Species affinis *P. mexicanae* sed foliis minoribus, foliolis paucioribus, plus minusve curvatis, plus minusve spathulatis, latioribus obtusioribusque, minus mucronatis; ramulis novellis minus pubescentibus; alabastris bracteis-que minoribus et minus pubescentibus; fructibus maturis rubro-brunneis nec atro-purpureis et glaucescentibus; trunco fere e basi ramoso (non trunco simplice).

Leaves persistent or tardily deciduous, odd-pinnate, 5–10 cm. long and 2.5–4.5 cm. broad, usually 6–8 cm. long and 2.5–3.5 cm. broad; petiole 10–15 mm. long, or sometimes 20 mm. on male trees, flattened and very narrowly winged; rachis very narrowly winged, slightly pubescent above; leaflets 4–9, usually 5–8 pairs, often not strictly opposite, thin and netted-veined, 8–25 mm. long and 5–9 mm. broad, usually 12–20 mm. long and 6–8 mm. broad; mature leaflets broadly rounded, more or less spatulate, or more or less mucronate at the tip (half-grown leaflets wine-red, acute-lanceolate, acute at tip) tapering into a deltoid or subcuneiform base; lateral leaflets more or less curved and inequilateral; midrib usually much nearer the side of the leaflet toward the parent twig; and usually more or less curved with the concave side toward the parent twig; leaflets dark green and sparingly pubescent along midrib above, pale green and glabrous below; almost sessile (except the terminal leaflet which is narrowed into a petiolule 4–6 mm. long) margin entire, slightly recurved. Female inflorescences appearing just before or with the new leaves, loosely and simply paniculate, 4–6 or sometimes 7 cm. long, almost glabrous. Female flowers small, usually subtended by a small ciliate margined bract and two similar bractlets, all three usually wine-red at the tips; perianth none; ovary ovate or sub-globose; styles 3, two shorter ones with 2-lobed stigmas, one, the longer, with a 3-lobed stigma. Male inflorescences in compact panicles, 2–4 cm. long, much more crowded than the female panicles; anthers very evident, reddish yellow, sometimes wine-colored as are the tips of the bracts subtending the flowers and branches of the panicles. Fruits lenticular to oval, dark reddish brown and slightly glaucescent when ripe, 5–6 mm. long, 4–5 mm. broad and 2.5–3 mm. thick, usually containing no embryo. Young twigs slender, 1.5–2.5 mm. thick, slightly pubescent, reddish colored when young, grayish brown when one year old from scaling off of the white cuticle; flower-buds small, 1.5–2.5 mm. long, sparingly pubescent.

A small tree or a large shrub, usually branched from the base, 5–10 m. high with a spread of 5–10 or rarely 12 m. Diameter of largest trunks

20–25, rarely 30–35 cm. at 30 cm. from ground. Not uncommon on limestone cliffs, and on soils derived from the weathering of limestone along the Pecos River near its junction with the Rio Grande in southwestern Texas and along the Rio Grande near the mouth of the Pecos on both sides of the river in Texas and in Coahuila, Mexico. It grows densely crowded in the narrow ravines or vegas in the limestone near the mouth of the Pecos River.

The young foliage of this species is wine-red in early spring.

This new species, *Pistacia texana*, differs from *P. mexicana*, HBK. in having smaller leaves with fewer leaflets (4–9, usually 5–8 pairs, instead of 8–18, usually 12–16 pairs), which are more or less spatulate, broader and more obtuse at the tip, not so markedly mucronate and more or less curved. The young twigs are much less pubescent and have smaller and less pubescent flower-buds and bracts than in *P. mexicana*. The mature fruits of *P. texana* are dark reddish brown, slightly glaucescent rather than glaucous and purplish black, as in *P. mexicana*. The trunks of the trees of *P. texana* are much branched near the ground, while *P. mexicana* often (perhaps always) has a single trunk. The smaller branches are rough grayish brown whereas those of *P. mexicana* are smooth and often light brownish gray, almost silvery.

TYPE LOCALITY: Near Hinojose Spring, Rio Grande Valley, near the mouth of the Pecos River, about 20 miles west of Comstock, Valverde County, Texas. The type specimens (type and merotypes¹) were collected by S. C. Mason, March 18, 1911, from a pistillate tree marked III–XVII, M. 26, about two miles above Hinojose Spring. The male syntypes were collected by S. C. Mason, March 18, 1911, from a tree growing on the bank of Hinojose Spring. Both the female type and male syntype are specimens in the National Herbarium and merotypes of both are in the Arnold Arboretum herbarium.

Numerous other collections (all in flower) made near the mouth of the Pecos in Valverde County, Texas, by F. B. Headley in March, 1907; and by Prof. S. C. Mason in March and April, 1910, and again in March, 1911, are all paratypes¹ as are the following specimens: National Herbarium, No. 19714, Mexican Boundary Survey, labeled "*Rhus Scheidiana*," fruiting twigs; Columbia College [Torrey] Herbarium, Mexican Boundary Survey "No. 152, Rocky Ravines near the mouth of the Pecos. Bigelow," fruiting twig; N.Y. Botanical Garden Herbarium, Mexican Boundary Survey No. 152, labeled "*Pistacia mexicana* HBK., *Rhus pterotooides*," fruiting twig; National Herbarium No. 364672, E. N. Plank, "near Shumla, Valverde County, Texas, June 6, 1895," sterile twig; National Herbarium, Vernon Bailey No. 480-g, "Rio Grande near Comstock, July 29, 1902," with nearly ripe fruit; Arnold Arboretum, S. S. H[astings], No. 25, "On banks of Rio Grande near Comstock," April 9, 1910, flowering branches; Arnold Arboretum, E. N. Plank, "Cañons of the Pecos River, Texas," 1899, leaves only; National Herbarium No. 19717, Dr. Edward Palmer, "Coahuila, Mexico, 1880" fruits; Arnold Arboretum, Dr. Edward Palmer, No. 196 (N $\frac{1}{2}$), Saltillo, Coahuila, Mex., July 1–8, 1880, fruiting branch; National Herbarium No. 842129, C. A. Purpus No. 4888, "Sierra de la Paila, Coahuila," Mex., Oct. 1910, fruiting branches; Arnold Arboretum, C. G. Pringle, No. 1930, "Rhus Mexicana, Gray . . . Canyons of the Sierra Madre near Monterey," Nuevo Leon, Mex., June, 1888, fruiting branch; National Herbarium, No. 19716, C. G. Pringle, No. 1930 as above; Arnold Arboretum, "*Pistacia Mexicana* HBK., Monterey [Nuevo Leon, Mex.], Coll. C. S. Sargent," April 6, 1887, two fruiting branches;

¹ Swingle, Walter T., Types of Species in Botanical Taxonomy, in Science n. s. xxxvii. 864–7, (No. 962, June 6, 1913).

National Herbarium No. 332516, *E. W. Nelson*, No. 4445, "Road over mountain between Victoria and Jaumave Valley, altitude 800-2500 ft.," Tamaulipas, Mex., May 31, 1898, two fruiting branches.

The species probably occurs not only along the Rio Grande, but also along its tributary streams, both in Texas and in the Mexican states of Coahuila, Nuevo Leon and Tamaulipas, wherever the soil conditions are suitable.

In March, 1907, Mr. F. B. Headley visited the Rio Grande Valley near the mouth of the Pecos River and sent specimens and photographs, adding the following notes on the species:

"A characteristic of . . . this species is that as fast as the old trunks die out new ones shoot forth from the same base. The majority of the trees observed were staminate. More trees are found growing in rocky than in silt soil. It may be that the pistache is crowded out from those soils and locations where it enters into competition with other trees. It is evidently highly drought-resistant, for it grows out of rocky soils at an altitude of from 200 to 300 feet above the river level. It also grows in moist locations, but most of the trees observed and photographed were growing out of the rock bottom of cañons which are periodically swept by floods. I found many trees having neither staminate nor pistillate blossoms. Goats seem to be fond of the leaves and it is probably for this reason that there are at present no young pistaches in this location." ¹

Prof. S. C. Mason's notes on an unusually large tree read as follows:

"Along the pond below the Hinojose spring I located what I believed to be the largest pistache tree yet recorded. . . . This was in a rich . . . alluvium and its roots doubtless penetrate to permanent moisture. The main old trunk is fourteen inches in diameter, besides several large sprouts from the ground seven or eight inches in diameter, others smaller; the entire tree having a spread of thirty-nine feet and a height of about thirty feet." ²

On the second trip by Professor Mason, April 7, 1910, this tree was found to be staminate and already out of bloom; but on his third trip, March 17, 1911, this tree was in full bloom and from it the male syntype was collected as well as many additional specimens (merotypes).

The larger trees in the alluvial plain of the Rio Grande near the mouth of the Pecos River are nearly all male. Professor Mason, who visited this region in March, and again in April, 1910, expressly to study this Pistache, reports as follows:

"On Saturday morning . . . I made a tramp alone of twelve or fifteen miles, going to the big bend of the Rio Grande six miles above our camp [near the Big Spring on Hinojose's ranch]. Just below this I discovered two large groves of pistache in the old alluvium at the front of the bluffs facing the river. . . . In all of these groups the pistillate trees were in very small proportion, not over ten per cent. This is a difficult matter to offer an explanation for. Another point may be merely accidental, but without exception the large trees are staminate. In no case did we find an unusually large tree to be pistillate. . . .

The recuperative power of this tree is remarkable. Parts of a stool that are old and dead at the top will send up most vigorous shoots, so that the top is renewed and kept vigorous. The growth is slow, a stem of apparently average growth, $4\frac{1}{2}$ inches in diameter, showing 33 annual rings. This stick shows on a radial measurement, $1\frac{1}{4}$ inches of yellow-brown heart wood to one inch of sap wood. The sap wood is

¹ Frank B. Headley, letter to Walter T. Swingle, dated San Antonio, Texas, April 1, 1907.

² Letter to Walter T. Swingle dated San Antonio, Texas, March 7, 1910.

nearly white with a pale yellowish cast. Both sap and heart wood show small, fine, medullary rays. The wood is rather tough, strong, compact, fine-grained, and weighs approximately 60 pounds to the cubic foot. It shows only a moderate tendency to check in seasoning and little inclination to warp. The wood could only be procured in short and small samples, seldom more than three or four feet long, and from six to eight inches in diameter, but for small articles, as in turnery, and possibly for blocks for wood engraving, it has valuable qualities.

It is a thin-foliaged species, highly intolerant of shade, cleaning up its stem and small branches very rapidly.”¹

The true *Pistacia mexicana* is a tree having a single well-marked trunk, not branched at or near the surface of the ground. This is shown clearly by photographs taken near Tehuecan, Puebla, by Dr. J. N. Rose and Mr. C. A. Purpus, and now filed in the National Herbarium, and by a photograph taken in the same region by Dr. D. T. MacDougal, now filed in the herbarium of the New York Botanical Garden. The Texas Pistache, on the contrary, almost never develops a single trunk. Prof. S. C. Mason says of the individuals of this species:

“All show a strong tendency to produce several trunks from the ground or to sprout low down, rather than to form a single stem. In the thickets in the rich soil along the river front (the alluvium of an ancient river flood plain, high above the present) these divergent stems are so highly curved and interlocked as to make the groups almost impenetrable. There is no sign of sprouting from the roots, or what may be termed suckering, nor any indication of surface roots. Deep penetration of the roots seems to be the rule.”¹

The smaller branches of *P. mexicana* are smooth and light brownish gray, while *P. texana* has rather rough, dark brownish gray branches, never silvery.

POSSIBLE ECONOMIC USES: At first I feared the American Pistaches were so different from the old-world species that the Pistache-nut tree (*Pistacia vera* L.) could not be grafted on them. However, it has been found by Mr. Eugene May, Jr., that the Pistache-nut tree can be budded readily on *P. mexicana*, and in view of the close affinity of the Texas species it is highly probable that it also can be used as a stock on which to grow the true Pistache-nut.

The Texas Pistache as it grows in the limestone country near the mouth of the Pecos, forms compact, rounded clumps, with dark, evergreen foliage. In early spring the new growth shows a beautiful wine-red color all over the clump. It is a handsome tree, well worthy of trial as an ornamental, especially in warmer parts of the southwestern United States.

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¹ Letter to Walter T. Swingle, from San Antonio, Texas, April 15, 1910.